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Mississinewa Reservoir Grant, Miami, and Wabash Counties, Indiana

Pacific Northwest Environmental Res. Lab.

Prepared For
National Environmental Research Center

April 1976

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

MISSISSINEWA RESERVOIR

GRANT, MIAMI, AND WABASH COUNTIES

INDIANA

EPA REGION V

WORKING PAPER No. 334

WITH THE COOPERATION OF THE

INDIANA STATE BOARD OF HEALTH

AND THE

INDIANA NATIONAL GUARD

APRIL, 1976

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning {§303(e)}, water quality criteria/standards review {§303(c)}, clean lakes {§314(a,b)}, and water quality monitoring {§106 and §305(b)} activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Indiana State Board of Health for professional involvement, to the Indiana National Guard for conducting the tributary sampling phase of the Survey, and to those Indiana wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the Division of Water Pollution Control, Indiana State Board of Health, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

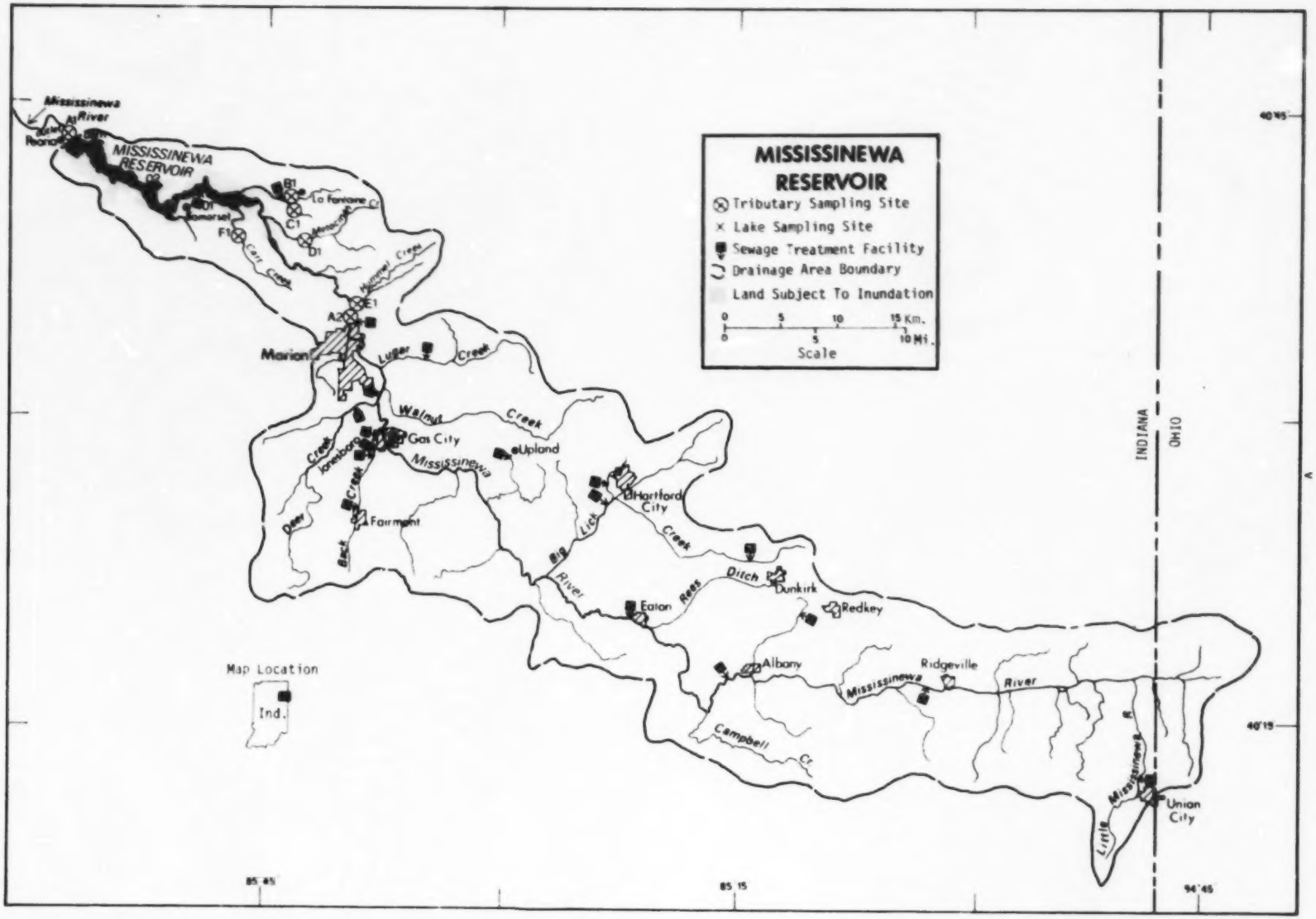
Major General Alfred F. Ahner, Adjutant General of Indiana, and Project Officers Lt. Colonel Charles B. Roberts (Retired) and Colonel Robert L. Sharp, who directed the volunteer efforts of the Indiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF INDIANA

LAKE NAME	COUNTY
Bass	Starke
Cataract	Owen, Putnam
Crooked	Steuben
Dallas	LaGrange
Geist	Hamilton, Marion
Hamilton	Steuben
Hovey	Posey
James	Kosciusko
James	Steuben
Long	Steuben
Marsh	Steuben
Mississinewa	Grant, Miami, Wabash
Maxinkuckee	Marshall
Monroe	Brown, Monroe
Morse	Hamilton
Olin	LaGrange
Oliver	LaGrange
Pigeon	Steuben
Sylvan	Noble
Tippecanoe	Kosciusko
Versailles	Ripley
Wawassee	Kosciusko
Webster	Kosciusko
Westler	LaGrange
Whitewater	Union
Winona	Kosciusko
Witmer	LaGrange


MISSISSINEWA RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Land Subject To Inundation
0 5 10 15 Km.
0 5 10 Mi.
Scale
Mississinewa River
MISSISSINEWA RESERVOIR
Marion
Gas City
Upland
Hartford City
Fairmount
Eaton
Dunkirk
Redkey
Albany
Ridgeville
Union City
Walnut Creek
Lugar Creek
Jonston Creek
Deer Creek
Back Creek
Big Lick Creek
Reas Ditch
Campbell Cr.
Little Mississinewa River
Mississinewa River
Carr Creek
Map Location
Ind.
INDIANA
OHIO
40°45'
40°15'
85°45'
85°15'
84°45'

MISSISSINEWA RESERVOIR

STORET NO. 1827

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Mississinewa Reservoir is eutrophic. It ranked last in overall trophic quality when the 27 Indiana lakes sampled in 1973 were compared using a combination of six water quality parameters*. Twenty-three of the lakes had less median total phosphorus, 25 had less median dissolved phosphorus, 25 had less median inorganic nitrogen, 16 had less mean chlorophyll a, and 24 had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at stations 2 and 3 in August, and depletion occurred at station 3 in October.

Survey limnologists did not observe surface algae or higher aquatic plants.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Mississinewa Reservoir was limited by phosphorus at the time the sample was taken (05/03/73). The reservoir data indicate phosphorus limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--During the Survey sampling year, 14 point sources were accounted for, although it was recognized that domestic point sources beyond the 40-kilometer limit of the Survey**

* See Appendix A.
** See Working Paper No. 175, "...Survey Methods, 1973-1976".

and industrial sources were contributing phosphorus to Mississinewa Reservoir. In the summer and fall of 1974, the Indiana Division of Water Pollution Control sampled 13 additional domestic and industrial point sources and provided the resulting data for this report (BonHomme, 1976). In addition, the loads from four municipalities some distance from the reservoir were estimated and included. The inclusion of the additional point-source loads permits a more realistic assessment of nutrient controllability.

It is calculated that the phosphorus contribution of point sources accounted for 30.5% of the total load to Mississinewa Reservoir. The wastewater treatment plants at Marion contributed 9.5%, the plants at Hartford City contributed 6.5%, and the remaining 27 domestic and industrial plants collectively contributed 14.5%. The reservoir phosphorus loading of 12.59 $g/m^2/yr$ is ten times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 17). However, the mean hydraulic retention time of the reservoir is a relatively short 51 days, and Vollenweider's model may not apply.

While even complete removal of phosphorus at the listed point sources would still leave a loading of 8.7 $g/m^2/yr$, in view of the questionable applicability of Vollenweider's model and the phosphorus-limited condition of the reservoir, it is likely that a high degree of phosphorus removal at the significant point sources would result in improvement in the trophic condition of the reser-

voir.

In 1972, Mississinewa Reservoir was studied by the Indiana Division of Water Pollution Control six months after the phosphate detergent ban became effective*. Comparison of these results with the 1973 Survey data indicates that the reduction of phosphorus levels in domestic sewage effluents substantially lessened the load to the reservoir.

2. Non-point sources--Non-point sources contributed 69.5% of the total phosphorus load to the reservoir. The Mississinewa River contributed 63.4%, and the five remaining gaged tributaries accounted for 3.2%. Ungaged tributaries were estimated to have contributed 2.7% of the total.

The phosphorus export rate of the Mississinewa River was a rather high 56 $kg/km^2/yr$. However, the rates of unimpacted Badger and Hummel creeks also were quite high (see page 16), and it is likely the higher rates are the result of land-use practices in the reservoir drainage.

* Anonymous, 1972.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 12.75 kilometers^2.
2. Mean depth: 7.2 meters.
3. Maximum depth: 34.7 meters.
4. Volume: 91.800 x 10^6 m^3.
5. Mean hydraulic retention time: 51 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Mississinewa River	1,815.6	18.44
Grant Creek	28.0	0.26
Badger Creek	7.8	0.07
Metocinah Creek	38.8	0.36
Hummel Creek	33.7	0.32
Cart Creek	32.9	0.31
Minor tributaries & immediate drainage -	121.6	1.15
Totals	2,078.4	20.91

2. Outlet -

Mississinewa River	2,091.2**	20.91

C. Precipitation***:

1. Year of sampling: 121.3 centimeters.
2. Mean annual: 98.9 centimeters.

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† Table of metric conversions--Appendix B.
†† McCollam, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Mississinewa Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at three stations on the reservoir (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 4.6 meters at station 1, 15.8 meters at station 2, and 22.6 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR MISSISSINEWA RESERVOIR
STORET CODE 1827

PARAMETER	1ST SAMPLING (5/ 3/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/ 3/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/15/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	12.4 - 15.1	14.2	14.6	22.9 - 25.3	24.1	24.1	18.2 - 28.7	20.8	20.2
DISS OXY (MG/L)	7.6 - 9.4	8.6	8.5	0.1 - 9.0	4.1	4.2	0.0 - 6.4	4.6	5.4
CNDCTVY (MCHOMO)	455. - 500.	468.	460.	459. - 521.	485.	480.	425. - 724.	528.	464.
PH (STAND UNITS)	7.9 - 8.1	8.0	8.0	7.4 - 8.6	7.9	7.9	7.6 - 8.3	7.9	7.9
TOT ALK (MG/L)	165. - 189.	172.	167.	156. - 181.	166.	165.	160. - 290.	200.	182.
TOT P (MG/L)	0.105 - 0.169	0.123	0.121	0.032 - 0.233	0.091	0.062	0.046 - 0.267	0.117	0.088
ORTHO P (MG/L)	0.058 - 0.084	0.070	0.071	0.006 - 0.036	0.015	0.011	0.005 - 0.067	0.028	0.021
NO2+NO3 (MG/L)	1.700 - 2.500	2.315	2.300	1.640 - 3.490	2.746	2.970	0.650 - 1.730	1.366	1.445
AMMONIA (MG/L)	0.070 - 0.150	0.112	0.110	0.060 - 0.620	0.152	0.080	0.070 - 0.670	0.254	0.130
KJEL N (MG/L)	0.500 - 0.900	0.669	0.600	0.700 - 1.800	1.046	0.800	0.700 - 1.600	1.093	1.000
INORG N (MG/L)	1.850 - 2.630	2.427	2.450	1.760 - 3.550	2.898	3.130	1.320 - 1.840	1.619	1.600
TOTAL N (MG/L)	2.600 - 3.300	2.985	3.000	2.940 - 4.190	3.792	3.920	2.170 - 2.830	2.459	2.440
CHLRPYL A (UG/L)	5.9 - 14.2	9.4	8.1	5.8 - 46.7	19.8	7.7	10.1 - 32.7	18.1	11.6
SECCHI (METERS)	0.5 - 1.0	0.7	0.7	0.3 - 0.9	0.6	0.7	0.3 - 0.9	0.7	0.8

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/03/73	1. *Cryptomonas sp.*	664
	2. Flagellates	513
	3. *Cyclotella sp.*	468
	4. *Asterionella sp.*	332
	5. *Synedra sp.*	90
	Other genera	213
	Total	2,280
08/03/73	1. *Stephanodiscus sp.*	256
	2. *Melosira sp.*	205
	3. *Synedra sp.*	102
	4. *Oscillatoria sp.*	85
	5. *Euglena sp.*	34
	Other genera	121
	Total	803
10/15/73	1. *Melosira sp.*	11,168
	2. *Stephanodiscus sp.*	685
	3. *Ankistrodesmus sp.*	304
	4. *Euglena sp.*	228
	5. *Cyclotella sp.*	228
	Other genera	135
	Total	12,748

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
05/03/73	1	5.9
	2	8.1
	3	14.2
08/03/73	1	46.7
	2	7.7
	3	5.0
10/15/73	1	32.7
	2	10.1
	3	11.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.041	2.560	9.0
0.050 P	0.091	2.560	25.6
0.050 P + 1.0 N	0.091	3.560	22.4
1.0 N	0.041	3.560	9.0

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Mississinewa Reservoir was high at the time the sample was taken (05/03/73). Also, a significant increase in yield with the addition of only orthophosphorus indicates that the reservoir was phosphorus limited at that time. Note that the addition of only nitrogen resulted in a yield no greater than that of the control yield.

The reservoir data indicate phosphorus limitation at all sampling times; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 35/1 or greater, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Indiana National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of February and March when two samples were collected. Sampling was begun in June, 1973, and was completed in May, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Indiana District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads at stations D-1, E-1, and F-1, in $kg/km^2/year$, and multiplying the means by the ZZ area in km^2.

The operators of the Eaton, Fairmount, Gas City, Jonesboro, Marion #1, Upland, and Shadybrook Mobile Home Park (MHP) wastewater treatment plants provided monthly effluent samples and corresponding flow data. The operator of the Deerwood MHP plant could not provide sufficient flow data, and the communities of Albany, La Fontaine, Redkey,

* See Working Paper No. 175.

Ridgeview, Somerset, and Union City did not participate; nutrient loads from these sources were estimated at 0.567 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m^3/capita/day.

Nutrient loads attributed to the remaining domestic and industrial point sources are based on data provided by the Indiana Division of Water Pollution Control (see page 2).

No nutrient data are available for the Stone Crest MHP or the Crystal Laundry, but these sources probably are relatively insignificant.

Note that all estimated phosphorus loads were reduced by 50% to adjust for the Indiana phosphate detergent ban in effect since January, 1971.

A. Waste Sources:

1. Known domestic* -

Name	Pop. Served**	Treatment	Mean Flow (m^3/d)	Receiving Water
Albany	2,293	tr. filter	867.9	Halfway Creek
Dunkirk	3,465	tr. filter	3,557.8	Dunkirk Drain/ Big Lick Creek
Eaton	1,594	tr. filter	603.3	Mississinewa River
Fairmount	3,427	act. sludge	1,479.8	Back Creek
Gas City	5,742	tr. filter	1,436.0	Mississinewa River
Hartford City	8,207			
#1		act. sludge	4,807.0	Big Lick Creek
#2		act. sludge	1,684.3	Little Lick Creek
Jonesboro	2,466	tr. filter	326.1	Back Creek
La Fontaine	793	stab. pond	300.2	Grant Creek
Marion	39,607			
#1		act. sludge	39,061.0	Mississinewa River
#2		act. sludge + pond	56.8	Mississinewa River
Redkey	1,667	tr. filter	631.0	Halfway Creek
Ridgeville	924	ext. aer.	349.7	Mississinewa River
Somerset	250	ext. aer.	94.6	Mississinewa River
Union City	3,995	tr. filter	1,512.1	Little Mississinewa River
Upland	3,202	tr. filter	1,523.2	Mississinewa River
East Brook High School	?	act. sludge	37.8	Monroe Ditch
Madison-Grant High School	?	act. sludge	18.9	Back Creek
Ciscell MHP	697	act. sludge + pond	132.5	Little Newby Ditch/Back Creek
County Line MHP	?	act. sludge + pond	11.4	Back Creek
Deerwood MHP	200	act. sludge	32.3	Deer Creek
Shadybrook MHP	130	sec. + pond	25.6	Lugar Creek
Stone Crest MHP	?	?	?	Mississinewa River

* BonHomme, 1976; Anonymous, 1971; treatment plant questionnaires.
** 1970 Census; mobile home parks from questionnaires.

2. Known industrial* -

Name	Mean Flow (m^3/d)	Receiving Water
Active Products Co., Marion	314.2	Mississinewa River
Anaconda Co., Marion	1,071.2	Mississinewa River
Crystal Laundry	?	Back Creek
Foster-Forbes Glass Co., Marion	734.3	Massey Creek
Irving Bros. Sand & Gravel, Marion	1,816.8	Walnut Creek
Owens-Illinois Glass Co., Gas City	3,084.8	Mississinewa River
RCA Corp., Marion	75.7	Mississinewa River
3-M Co., Hartford City	2,604.1	Little Lick Creek

* BonHomme, 1976.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Mississinewa River	101,710	63.4
Grant Creek	1,035	0.6
Badger Creek	395	0.2
Metocinah Creek	1,205	0.8
Hummel Creek	1,605	1.0
Cart Creek	950	0.6
b. Minor tributaries & immediate drainage (non-point load) -	4,380	2.7
c. Known domestic STP's -		
Albany	2,600	1.6
Dunkirk	1,555	1.0
Eaton	1,925	1.2
Fairmount	1,965	1.2
Gas City	1,830	1.1
Hartford City		
#1	8,695	5.4
#2	1,790	1.1
Jonesboro	325	0.2
La Fontaine	450	0.3
Marion		
#1	15,145	9.4
#2	65	<0.1
Redkey	1,890	1.2
Ridgeville	1,050	0.7
Somerset	140	<0.1
Union City	4,530	2.8
Upland	2,345	1.5
East Brook HS	90	<0.1
Madison-Grant HS	50	<0.1
Ciscell MHP	200	0.1
County Line MHP	5	<0.1
Deerwood MHP	115	<0.1
Shadybrook MHP	25	<0.1
Stone Crest MHP	?	-

Source	kg P/ yr	% of total
d. Septic tanks* -	20	<0.1
e. Known industrial -		
Active Products Co.	435	0.3
Anaconda Co.	145	0.1
Crystal Laundry	?	-
Foster-Forbes Glass	40	<0.1
Irving Bros. Sand & Gravel	40	<0.1
Owens-Illinois Glass	3,455	2.2
RCA Corp.	10	<0.1
3-M Co.	30	<0.1
f. Direct precipitation** -	225	0.1
Total	160,460	100.0

2. Outputs -

   Lake outlet - Mississinewa River 81,570

3. Net annual P accumulation - 78,890 kg.

* Estimate based on five recreation areas, one trailer park, and 120 lake-shore residences; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Mississinewa River	2,562,810	78.4
Grant Creek	20,955	0.6
Badger Creek	12,475	0.4
Metocinah Creek	30,950	0.9
Hummel Creek	34,260	1.0
Cart Creek	58,525	1.8
b. Minor tributaries & immediate drainage (non-point load) -	145,675	4.5
c. Known domestic STP's -		
Albany	7,800	0.2
Dunkirk	9,330	0.3
Eaton	9,635	0.3
Fairmount	9,520	0.3
Gas City	7,625	0.2
Hartford City		
#1	154,940	4.7
#2	9,950	0.3
Jonesboro	5,005	0.2
La Fontaine	2,695	0.1
Marion		
#1	107,300	3.3
#2	265	<0.1
Redkey	5,670	0.2
Ridgeville	3,145	0.1
Somerset	850	<0.1
Union City	13,585	0.4
Upland	10,050	0.3
East Brook HS	540	<0.1
Madison-Grant HS	300	<0.1
Ciscell MHP	1,200	<0.1
County Line MHP	30	<0.1
Deerwood MHP	680	<0.1
Shadybrook MHP	40	<0.1
Stone Crest MHP	?	-

Source	kg P/yr	% of total
d. Septic tanks* -	1,190	<0.1
e. Known industrial -		
Active Products Co.	?	-
Anaconda Co.	?	-
Crystal Laundry	?	-
Foster-Forbes Glass	?	-
Irving Bros. Sand & Gravel	?	-
Owens-Illinois Glass	13,050	0.4
RCA Corp.	?	-
3-M Co.	14,120	0.4
f. Direct precipitation** -	13,765	0.4
Total	3,267,930	100.0

2. Outputs -

Lake outlet - Mississinewa River	2,402,895

3. Net annual N accumulation - 865,035 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Mississinewa River	56	1,412
Grant Creek	37	748
Badger Creek	51	1,599
Metocinah Creek	31	798
Hummel Creek	48	1,017
Cart Creek	29	1,779

* Estimate based on five recreation areas, one trailer park, and 120 lakeshore residences; see Working Paper No. 175.
** See Working Paper No. 175.

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	12.59	6.19	256.3	67.8

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Mississinewa Reservoir:

"Dangerous" (eutrophic loading)	1.24
"Permissible" (oligotrophic loading)	0.62

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. EPA Publ. OWP-1, vol. 5, Wash., DC.

Anonymous, 1972. Statewide lake survey--data for Mississinewa Reservoir. IN Div. of Water Poll. Contr., Indianapolis.

BonHomme, Harold L., 1976. Personal communication (review of preliminary report; point-source data). IN Div. of Water Poll. Contr., Indianapolis.

McCollam, Archie, 1975. Personal communication (lake morphometry). U.S. Geological Survey, Indianapolis.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLOR A	15-MIN DO	MEDIAN DISS ORTHO P
1805	CATARACT LAKE	0.058	1.660	466.667	10.744	15.000	0.013
1811	GEIST RESERVOIR	0.074	1.080	472.500	45.950	11.600	0.009
1817	JAMES LAKE	0.024	1.030	434.000	11.533	15.000	0.008
1827	MISSISSINEWA RESERVOIR	0.107	2.480	473.444	15.778	15.000	0.029
1828	MONROE RESERVOIR	0.025	0.325	438.823	6.947	15.000	0.007
1829	MORSE RESERVOIR	0.084	3.325	473.222	56.167	15.000	0.009
1836	WAWASEE LAKE	0.012	0.210	364.500	5.800	14.600	0.003
1837	WEBSTER LAKE	0.025	0.790	431.000	11.580	15.000	0.005
1839	WHITEWATER LAKE	0.084	1.620	470.167	33.083	15.000	0.012
1840	WINONA LAKE	0.035	1.250	444.667	11.211	15.000	0.011
1841	WESTLER LAKE	0.035	0.860	427.125	10.712	15.000	0.013
1842	WITMER LAKE	0.035	0.900	440.333	11.917	15.000	0.011
1843	LAKE MAXINKUCKEE	0.020	0.220	400.400	5.483	15.000	0.003
1844	TIPPECANOE LAKE	0.019	0.195	391.500	6.050	15.000	0.005
1845	DALLAS LAKE	0.029	0.830	413.333	10.867	15.000	0.014
1846	OLIN LAKE	0.012	1.460	403.333	4.867	14.900	0.003
1847	OLIVER LAKE	0.009	0.920	392.000	3.767	14.800	0.004
1848	SYLVAN LAKE	0.170	0.130	469.833	47.480	14.800	0.017
1849	HOVEY LAKE	0.062	1.050	489.333	84.267	7.600	0.024
1850	VERSAILLES LAKE	0.139	1.090	482.000	25.078	14.500	0.019
1851	BASS LAKE	0.040	0.250	471.375	29.367	7.000	0.012
1852	CROOKED LAKE	0.019	0.120	410.111	5.578	15.000	0.005
1853	LAKE JAMES	0.016	0.190	352.444	4.856	15.000	0.005
1854	LONG LAKE	0.204	1.920	442.667	16.100	15.000	0.150
1855	PIGEON LAKE	0.058	1.945	442.667	11.900	15.000	0.015
1856	MARSH LAKE	0.093	0.270	451.333	34.467	15.000	0.055
1857	HAMILTON LAKE	0.033	0.720	413.167	17.450	15.000	0.018

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1805	CATARACT LAKE	37 (9)	15 (4)	31 (8)	62 (16)	35 (0)	37 (9)	217
1811	GEIST RESERVOIR	27 (7)	35 (9)	15 (4)	12 (3)	92 (24)	62 (16)	243
1817	JAMES LAKE	73 (19)	42 (11)	58 (15)	50 (13)	35 (0)	65 (17)	323
1827	MISSISSINEWA RESERVOIR	12 (3)	4 (1)	8 (2)	38 (10)	35 (0)	8 (2)	105
1828	MONROE RESERVOIR	67 (17)	69 (18)	54 (14)	73 (19)	35 (0)	69 (18)	367
1829	MOWSE RESERVOIR	23 (6)	0 (0)	12 (3)	4 (1)	35 (0)	58 (15)	132
1836	WAWASEE LAKE	94 (24)	85 (22)	96 (25)	88 (23)	85 (22)	98 (25)	546
1837	WEBSTER LAKE	67 (17)	62 (16)	62 (16)	54 (14)	35 (0)	81 (21)	361
1839	WHITEWATER LAKE	19 (5)	19 (5)	23 (6)	19 (5)	35 (0)	42 (11)	157
1840	WINONA LAKE	50 (12)	27 (7)	38 (10)	58 (15)	35 (0)	52 (13)	260
1841	WESTLER LAKE	50 (12)	54 (14)	65 (17)	65 (17)	35 (0)	37 (9)	306
1842	WITMER LAKE	50 (12)	50 (13)	50 (13)	42 (11)	35 (0)	52 (13)	279
1843	LAKE MAXINKUCKEE	77 (20)	81 (21)	85 (22)	85 (22)	35 (0)	98 (25)	461
1844	TIPPECANOE LAKE	85 (22)	88 (23)	92 (24)	77 (20)	35 (0)	85 (22)	462
1845	DALLAS LAKE	62 (16)	58 (15)	69 (18)	69 (18)	35 (0)	31 (8)	324
1846	OLIN LAKE	94 (24)	23 (6)	81 (21)	92 (24)	73 (19)	92 (24)	455
1847	OLIVER LAKE	100 (26)	46 (12)	88 (23)	100 (26)	79 (20)	88 (23)	501
1848	SYLVAN LAKE	4 (1)	96 (25)	27 (7)	8 (2)	79 (20)	23 (6)	237
1849	HOVEY LAKE	31 (8)	38 (10)	0 (0)	0 (0)	96 (25)	12 (3)	177
1850	VERSAILLES LAKE	8 (2)	31 (8)	4 (1)	27 (7)	88 (23)	15 (4)	173
1851	BASS LAKE	42 (11)	77 (20)	19 (5)	23 (6)	100 (26)	46 (12)	307
1852	CROOKED LAKE	81 (21)	100 (26)	77 (20)	81 (21)	35 (0)	75 (19)	449
1853	LAKE JAMES	88 (23)	92 (24)	100 (26)	96 (25)	35 (0)	75 (19)	486
1854	LONG LAKE	0 (0)	12 (3)	44 (11)	35 (9)	35 (0)	0 (0)	126
1855	PIGEON LAKE	37 (9)	8 (2)	44 (11)	46 (12)	35 (0)	27 (7)	197
1856	MARSH LAKE	15 (4)	73 (19)	35 (9)	15 (4)	35 (0)	4 (1)	177
1857	HAMILTON LAKE	58 (15)	65 (17)	73 (19)	31 (8)	35 (0)	19 (5)	281

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1836	WAWASEE LAKE	546
2	1847	OLIVER LAKE	501
3	1853	LAKE JAMES	486
4	1844	TIPPECANOE LAKE	462
5	1843	LAKE MAXINKUCKEE	461
6	1846	OLIN LAKE	455
7	1852	CROOKED LAKE	449
8	1828	MONROE RESERVOIR	367
9	1837	WEBSTER LAKE	361
10	1845	DALLAS LAKE	324
11	1817	JAMES LAKE	323
12	1851	BASS LAKE	307
13	1841	WESTLER LAKE	306
14	1857	HAMILTON LAKE	281
15	1842	WITMER LAKE	279
16	1840	WINONA LAKE	260
17	1811	GEIST RESERVOIR	243
18	1848	SYLVAN LAKE	237
19	1805	CATAHACT LAKE	217
20	1855	PIGEON LAKE	197
21	1856	MARSH LAKE	177
22	1849	HOVEY LAKE	177
23	1850	VERSAILLES LAKE	173
24	1839	WHITEWATER LAKE	157
25	1829	MOWSE RESERVOIR	132
26	1854	LONG LAKE	126
27	1827	MISSISSINEWA RESERVOIR	105

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR INDIANA 03/29/76

LAKE CODE 1827 MISSISSINEWA LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 2091.2

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1827A1	2091.2	21.07	37.10	24.58	20.44	19.82	9.63	7.25	4.16	23.67	22.23	36.53	26.22	20.91
1827A2	1815.6	22.74	27.84	21.04	39.36	16.08	10.70	6.26	3.82	14.22	10.05	27.01	23.62	18.44
1827B1	28.8	0.340	0.396	0.566	0.538	0.340	0.263	0.156	0.051	0.051	0.051	0.136	0.255	0.261
1827C1	7.8	0.088	0.110	0.161	0.150	0.093	0.074	0.042	0.011	0.011	0.014	0.037	0.074	0.072
1827D1	38.8	0.453	0.566	0.793	0.736	0.481	0.368	0.218	0.074	0.071	0.074	0.190	0.340	0.362
1827E1	33.7	0.396	0.481	0.680	0.651	0.425	0.311	0.190	0.062	0.062	0.065	0.164	0.311	0.316
1827F1	32.9	0.396	0.481	0.680	0.623	0.396	0.311	0.184	0.062	0.059	0.062	0.161	0.311	0.310
1827ZZ	121.5	1.50	1.76	2.46	2.32	1.50	1.13	0.68	0.26	0.24	0.26	0.59	1.08	1.15

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 2091.2
SUM OF SUB-DRAINAGE AREAS = 2078.2
TOTAL FLOW IN = 252.43
TOTAL FLOW OUT = 252.70

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1827A1	6	73	37.775	9	89.481				
	7	73	9.628	9	5.975				
	8	73	22.144	16	58.899				
	9	73	6.881	13	2.973				
	10	73	14.328	15	12.205				
	11	73	13.989	19	15.484				
	12	73	31.978	3	144.699				
	1	74	54.283	8	137.628				
	2	74	104.829	4	183.356	19	31.715		
	3	74	21.492	14	2.839	29	43.608		
	4	74	44.939	16	165.937				
	5	74	29.619	15	47.886				
1827A2	6	73	36.132	9	48.252				
	7	73	8.552	9	4.332				
	8	73	16.679	16	77.988				
	9	73	2.832	13	2.492				
	10	73	2.718	15	2.435				
	11	73	19.227	19	4.417				
	12	73	44.939	3	15.348				
	1	74	74.162	8	9.599				
	2	74	31.941	4	28.848	19	48.488		
	3	74	24.692	14	13.535	29	64.534		
	4	74	47.431	16	15.178				
	5	74	25.868	15	93.384				

TRIBUTARY FLOW INFORMATION FOR INDIANA 03/29/76

LAKE CODE 1827 MISSISSINEWA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
182781	6	73	0.549	9	0.748				
	7	73	0.113	9	0.051				
	8	73	0.249	16	1.186				
	9	73	0.028	13	0.023				
	10	73	0.028	15	0.023				
	11	73	0.300	19	0.051				
	12	73	0.685	3	0.238				
	1	74	1.155	8	0.130				
	2	74	0.487	4	0.306	19	0.623		
	3	74	0.388	14	0.193	29	1.000		
	4	74	0.725	16	0.238				
	5	74	0.388	15	1.436				
1827C1	6	73	0.153	9	0.201				
	7	73	0.266	9	0.008				
	8	73	0.068	16	0.334				
	9	73	0.003	13	0.108				
	10	73	0.003	15	0.002				
	11	73	0.082	19	0.008				
	12	73	0.187	3	0.059				
	1	74	0.317	8	0.034				
	2	74	0.133	4	0.082	19	0.170		
	3	74	0.102	14	0.051	29	0.272		
	4	74	0.201	16	0.059				
	5	74	0.108	15	0.399				
182701	6	73	0.753	9	1.019				
	7	73	0.178	9	0.091				
	8	73	0.340	16	1.614				
	9	73	0.059	13	0.051				
	10	73	0.057	15	0.051				
	11	73	0.399	19	0.093				
	12	73	0.801	3	0.311				
	1	74	1.501	8	0.201				
	2	74	0.651	4	0.425	19	0.850		
	3	74	0.745	14	0.280	29	1.359		
	4	74	0.807	16	0.311				
	5	74	0.538	15	1.954				
1827E1	6	73	0.651	9	0.878				
	7	73	0.153	9	0.079				
	8	73	0.300	16	1.416				
	9	73	0.051	13	0.045				
	10	73	0.048	15	0.045				
	11	73	0.345	19	0.079				
	12	73	0.694	3	0.278				
	1	74	1.320	8	0.173				
	2	74	0.572	4	0.368	19	0.736		
	3	74	0.643	14	0.244	29	0.116		
	4	74	0.697	16	0.275				
	5	74	0.464	15	1.671				

TRIBUTARY FLOW INFORMATION FOR INDIANA 03/29/76

LAKE CODE 1827 MISSISSINEWA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1827F1	6	73	0.637	9	0.850				
	7	73	0.150	9	0.076				
	8	73	0.294	16	1.359				
	9	73	0.051	13	0.045				
	10	73	0.048	15	0.042				
	11	73	0.337	19	0.079				
	12	73	0.677	3	0.272				
	1	74	1.291	8	0.170				
	2	74	0.561	4	0.340	19	0.708		
	3	74	0.629	14	0.238	29	1.133		
	4	74	0.682	16	0.266				
	5	74	0.453	15	1.642				
1827ZZ	6	73	2.407	9	3.228				
	7	73	0.566	9	0.283				
	8	73	1.104	16	5.210				
	9	73	0.190	13	0.167				
	10	73	0.184	15	0.164				
	11	73	1.274	19	0.283				
	12	73	3.002	3	1.019				
	1	74	4.955	8	0.651				
	2	74	2.124	4	1.331	19	2.718		
	3	74	1.642	14	0.906	29	4.304		
	4	74	3.171	16	1.019				
	5	74	1.671	15	6.230				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/03/30

182701
40 40 15.0 085 48 10.0 3
MISSISSINEWA RESERVOIR
18169 INDIANA
051791

11EPALES 2111202
0018 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/03	10 00	0000	15.1		18	500	8.00	189	0.150	0.900	1.700	0.084
	10 00	0003	15.1	7.8		495	8.00	187	0.150	0.800	2.000	0.083
	10 00	0015	15.1	7.6		500	8.00	189	0.140	0.800	2.400	0.083
73/08/03	10 30	0000	24.2		13	475	8.60	156	0.100	1.700	1.740	0.089
	10 30	0005	23.8	9.0		477	8.40	156	0.120	1.300	1.640	0.089
	10 30	0015	23.3	8.2		459	8.20	156	0.130	1.300	1.760	0.011
73/10/15	15 10	0000	19.6		11	724	8.30	290	0.380	1.600	1.060	0.045
	15 10	0005	18.7	6.0		704	7.90	260	0.440	1.400	1.280	0.064
	15 10	0008	18.2	5.0		700	7.80	256	0.480	1.500	1.260	0.067

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/03	10 00	0000	0.162	5.9
	10 00	0003	0.169	
	10 00	0015	0.131	
73/08/03	10 30	0000	0.168	46.7
	10 30	0005	0.135	
	10 30	0015	0.180	
73/10/15	15 10	0000	0.143	32.7
	15 10	0005	0.204	
	15 10	0008	0.267	

STORET RETRIEVAL DATE 76/03/30

182702
40 40 50.0 085 53 08.0 3
MISSISSINEWA RESERVOIR
18169 INDIANA
051791

11EPALES 2111202
0055 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/03	10 45	0000	14.7		27	460	8.00	167	0.110	0.800	2.300	0.065
	10 45	0005	14.6	8.1		460	8.00	167	0.100	0.700	2.300	0.071
	10 45	0015	14.6	8.0		460	8.00	167	0.100	0.600	2.300	0.071
	10 45	0035	14.6	8.0		460	8.00	167	0.110	0.500	2.300	0.075
	10 45	0052	13.6	8.9		480	7.90	176	0.150	0.600	2.300	0.074
73/08/03	11 00	0000	25.3		26	497	8.00	164	0.070	1.000	2.970	0.010
	11 00	0005	24.6	5.2		490	7.90	165	0.070	0.800	3.050	0.012
	11 00	0015	24.5	5.1		490	7.90	165	0.080	0.800	3.120	0.013
	11 00	0025	24.5	3.9		503	7.70	168	0.140	0.800	2.990	0.022
	11 00	0041	23.7	0.2		521	7.50	181	0.620	1.800	2.090	0.036
73/10/15	15 25	0000	20.6		33	447	7.90	168	0.080	0.700	1.540	0.014
	15 25	0005	20.6	5.6		448	7.90	167	0.070	0.700	1.470	0.017
	15 25	0015	20.3	5.4		457	7.80	170	0.120	0.800	1.440	0.020
	15 25	0025	20.1	5.0		470	7.80	179	0.130	0.800	1.450	0.022
	15 25	0036	20.0	3.6		531	7.70	197	0.310	1.200	1.120	0.029

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/03	10 45	0000	0.121	8.1
	10 45	0005	0.118	
	10 45	0015	0.121	
	10 45	0035	0.122	
	10 45	0052	0.126	
73/08/03	11 00	0000	0.062	7.7
	11 00	0005	0.049	
	11 00	0015	0.053	
	11 00	0025	0.068	
	11 00	0041	0.233	
73/10/15	15 25	0000	0.046	10.1
	15 25	0005	0.050	
	15 25	0015	0.057	
	15 25	0025	0.074	
	15 25	0036	0.139	

STORET RETRIEVAL DATE 76/03/30

182703
40 42 46.0 085 56 39.0 3
MISSISSINEWA RESERVOIR
18103 INDIANA

051791

11EPALES 2111202
0078 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/03	11 30	0000	13.9		40	455	8.10	167	0.100	0.800	2.500	0.058
	11 30	0004	13.9	9.4		455	8.10	167	0.070	0.500	2.500	0.062
	11 30	0015	13.8	9.4		455	8.10	165	0.070	0.600	2.500	0.059
	11 30	0045	13.8	9.4		455	8.10	168	0.070	0.500	2.500	0.061
	11 30	0074	12.4	9.4		455	8.10	166	0.130	0.600	2.500	0.070
73/08/03	11 30	0000	24.5		35	477	8.00	163	0.060	0.800	3.360	0.006
	11 30	0005	24.1	4.6		473	7.90	165	0.070	0.700	3.360	0.007
	11 30	0015	24.0	3.9		473	7.80	165	0.060	0.700	3.490	0.010
	11 30	0030	23.9	1.0		480	7.50	169	0.060	0.700	3.360	0.019
	11 30	0045	22.9	0.1		492	7.40	179	0.400	1.200	2.970	0.031
73/10/15	14 20	0000	20.7		36	435	8.00	162	0.100	1.100	1.730	0.005
	14 20	0005	20.7	6.4		430	8.00	162	0.110	0.800	1.730	0.007
	14 20	0015	20.5	6.2		425	7.90	160	0.090	0.800	1.640	0.012
	14 20	0035	20.3	6.0		430	7.90	184	0.130	0.900	1.710	0.015
	14 20	0050	20.2	1.8		570	7.60	200	0.440	1.400	1.040	0.030
	14 20	0060	20.1	0.0		623	7.60	238	0.670	1.600	0.650	0.040

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/03	11 30	0000	0.107	14.2
	11 30	0004	0.108	
	11 30	0015	0.105	
	11 30	0045	0.105	
	11 30	0074	0.110	
73/08/03	11 30	0000	0.039	5.0
	11 30	0005	0.032	
	11 30	0015	0.035	
	11 30	0030	0.045	
	11 30	0045	0.080	
73/10/15	14 20	0000	0.046	11.6
	14 20	0005	0.054	
	14 20	0015	0.047	
	14 20	0035	0.103	
	14 20	0050	0.198	
	14 20	0060	0.205	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/03/30

1827A1
40 44 02.0 085 57 30.0 4
MISSISSINEWA RIVER
18 7.5 PEORIA
0/MISSISSINEWA RES 051791
SEC RD BRDG JUST BELO DAM
11EPALES 2111204
J000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	11 10		1.920	1.050	0.090	0.028	0.050
73/07/09	13 50		2.900	1.890	0.470	0.072	0.135
73/08/16	13 45		2.600	1.000	0.300	0.030	0.050
73/09/13	14 00		1.800	0.860	0.038	0.006	0.030
73/10/15	14 23		1.360	1.400	0.150	0.020	0.060
73/11/19	15 01		1.360	0.600	0.028	0.020	0.050
73/12/03	10 41		2.900	1.400	0.180	0.030	0.155
74/01/08	11 00		3.960	1.300	0.148	0.112	0.240
74/02/04	10 45		3.200	0.900	0.110	0.120	0.240
74/02/19	10 55		2.700	1.050	0.115	0.100	0.193
74/03/14	09 30		2.800	1.100	0.100	0.090	0.170
74/03/29	12 00		3.000	1.050	0.140	0.080	0.130
74/04/16			3.000	1.500	0.140	0.080	0.095
74/05/15	11 00		2.640	0.700	0.080	0.060	0.120

STORET RETRIEVAL DATE 76/03/30

1827A2
40 35 05.0 085 39 40.0 4
MISSISSINEWA RIVER
18 7.5 MARION
I/MISSISSINEWA RES 051791
HWY 9/37 BRDG .5 N OF MARION CITY LIMITS
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	09 30		5.600	3.170	0.198	0.132	0.320
73/07/09	12 55		2.400	2.310	0.252	0.066	0.210
73/08/16	12 30		3.300	2.900	0.094	0.147	0.620
73/09/13	10 30		0.110	3.100	1.020	0.060	0.250
73/10/15	12 34		1.360	2.900	1.600	0.273	0.420
73/11/19	13 05		2.100	2.300	0.860	0.108	0.230
73/12/03	09 22		3.800	1.800	0.360	0.100	0.180
74/01/08	09 15		3.000	1.200	0.288	0.124	0.180
74/02/04	09 15		2.940	1.000	0.155	0.085	0.165
74/02/19	09 30		2.700	1.100	0.160	0.140	0.240
74/03/14	12 15		2.760	1.000	0.105	0.065	0.145
74/03/29	10 05		1.600	3.200	0.175	0.075	
74/04/16	09 30		2.640	2.600	0.300	0.065	0.105
74/05/15	09 35		3.700	3.000	0.170	0.105	

STORET RETRIEVAL DATE 76/03/30

182781
40 40 29.0 085 43 30.0 4
GRANT CREEK
18 7.5 LA FONTAINE
T/MISSISSINEWA RES 051791
HWY 15 BRDG IN LA FONTAINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	10 30		1.220	1.680	0.154	0.036	0.115
73/07/09	13 15		0.220	1.470	0.082	0.032	0.150
73/08/16	13 20		1.200	1.540	0.076	0.066	0.155
73/09/13	10 59		0.250	0.370	0.020	0.014	0.045
73/10/15	13 04		0.130	0.300	0.044	0.017	0.060
73/11/19	13 56		0.152	1.000	0.024	0.052	0.390
73/12/03	09 52		2.100	0.800	0.088	0.040	0.060
74/01/08	10 00		1.440	0.400	0.049	0.012	0.035
74/02/04	09 52		0.276	0.750	0.070	0.020	0.050
74/02/19	09 55		1.260	0.400	0.055	0.030	0.050
74/03/14	10 05		1.440	0.400	0.035	0.020	0.045
74/03/29	10 30		2.900	3.600	0.163	0.085	
74/04/16	09 55		0.860	0.500	0.055	0.010	0.025
74/05/15	10 05		5.500	1.900	0.090	0.120	0.440

STORET RETRIEVAL DATE 76/03/30

1827C1
40 40 02.0 085 43 44.0 4
BADGER CREEK
18 7.5 LA FONTAINE
T/MISSISSINEWA RES 051791
1100 S RD BRDG .5 MI W OF IN HWY 15
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	10	25	5.500	2.000	0.138	0.176	0.190
73/07/09	15	13	3.600	0.720	0.044	0.132	0.165
73/08/16	13	15	2.040	1.150	0.056	0.168	0.260
73/09/13	10	59	1.900	0.500	0.046	0.044	0.080
73/10/15	12	57	0.029	0.750	0.046	0.078	0.145
73/11/19	13	33	5.000	2.500	1.440	0.390	0.450
73/12/03	09	43	4.620	0.800	0.160	0.152	0.170
74/01/08	09	50	4.300	0.850	0.092	0.056	0.087
74/02/04	09	45	4.000	0.600	0.095	0.045	0.070
74/02/19	10	00	2.800	0.800	0.240	0.100	0.125
74/03/14	10	10	4.000	0.700	0.165	0.060	0.105
74/03/29	11	00	5.800	2.300	0.125	0.120	
74/04/16	10	00	3.900	1.900	0.110	0.040	0.045
74/05/15	10	10	8.500	1.600	0.195	0.090	0.345

STORET RETRIEVAL DATE 76/03/30

1127D1
40 38 32.0 085 42 35.0 4
METOCINAM CREEK
18 7.5 LA FONTAINE
T/MISSISSINEWA RES 051791
HWY 15 BRDG 2.2 SSE OF LA FONTAINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	10	15	1.500	2.730	0.200	0.024	0.050
73/07/09	13	10	0.290	1.050	0.138	0.009	0.020
73/08/16	13	00	0.680	1.200	0.093	0.074	0.183
73/09/13	10	55	0.340	1.000	0.144	0.005	0.010
73/10/15	12	52	0.300	0.300	0.069	0.008	0.015
73/11/19	13	27	0.320	0.200	0.048	0.020	0.020
73/12/03	09	40	1.680	1.150	0.088	0.052	0.100
74/01/08	09	45	1.040	0.700	0.140	0.016	0.035
74/02/04	09	37	0.672	0.500	0.170	0.010	0.025
74/02/19	09	50	0.910	1.200	0.195	0.085	0.280
74/03/14	09	50	0.980	0.600	0.090	0.015	0.050
74/03/29	10	43	2.100	4.600	0.165	0.115	
74/04/16	09	45	0.552	2.400	0.170	0.010	0.025
74/05/15	10	00	4.900	2.725	0.160	0.085	0.550

STORET RETRIEVAL DATE 76/03/30

1827E1
40 35 17.0 085 39 38.0 4
HUMMEL CREEK
18 7.5 MARION
T/MISSISSINEWA RES 051791
SEC RD BRDG .6 MI N OF MARION CITY LIMIT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	09 54		4.500	3.150	0.273	0.054	0.130
73/07/09	13 00		1.580	1.100	0.017	0.025	0.080
73/08/16	12 45		1.740	1.600	0.082	0.105	0.270
73/09/13	10 32		0.320	0.840	0.054	0.021	0.045
73/10/15	12 37		0.010K	0.750	0.013	0.026	0.050
73/11/19	13 10		0.060	0.400	0.028	0.005	0.031
73/12/03	09 25		3.400	1.300	0.060	0.116	0.230
74/01/08	09 20		2.800	0.700	0.068	0.068	0.115
74/02/04	09 21		1.680	2.400	0.125	0.060	0.230
74/02/19	09 35		1.500	0.800	0.160	0.075	0.130
74/03/14	09 35		1.850	1.900	0.095	0.045	0.240
74/03/29	10 10		1.520	1.800	0.075	0.065	0.400
74/04/16	09 33		1.320	1.700	0.100	0.030	0.130
74/05/15	09 45		2.940	3.100	0.170	0.097	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827F1
40 38 20.0 085 47 40.0 4
CART CREEK
18 7.5 SOMERSET
T/MISSISSINEWA RES 051791
600 N RD BRDG 2.6 E OF 800 W RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	11 50		8.800	0.880	0.046	0.038	0.070
73/07/09	14 20		2.400	1.050	0.064	0.056	0.120
73/08/16	14 15		2.100	1.150	0.039	0.130	0.240
73/09/13	15 00		1.320	2.400	0.061	0.021	0.055
73/10/15	15 55		0.830	0.450	0.028	0.021	0.050
73/11/19	15 28		1.920	0.500	0.028	0.028	0.042
73/12/03	10 15		4.900	0.800	0.032	0.080	0.115
74/01/08	10 18		5.200	0.600	0.028	0.024	0.040
74/02/04	10 10		4.400	1.100	0.165	0.035	0.065
74/02/19	10 15		4.200	0.400	0.030	0.030	0.045
74/03/14	11 00		5.460	0.500	0.020	0.025	0.030
74/03/29	10 35		3.080	2.800	0.095	0.120	
74/04/16	10 15		4.700	0.900	0.041	0.015	0.022
74/05/15	10 25		16.000	2.100	0.240	0.105	0.360

STORET RETRIEVAL DATE 76/03/30

1827ZA PD1827ZA P000130
40 32 31.0 085 35 00.0 4
SHADY BROOK MHP
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
LUGER CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/18			0.020	24.000	1.100	3.150	4.500		
73/08/22	14 00		0.012	11.000	0.252	0.660		0.006	0.006
73/09/28	15 30		0.290	9.900	0.640	2.550	4.700	0.006	0.006
73/10/30	14 30		3.300	1.200	0.100	3.570	4.500	0.006	0.006
73/11/30	15 00		1.900	1.000	0.045	1.400	1.950	0.006	0.006
73/12/31	16 30		0.840	3.100	0.120	1.260	2.400	0.006	0.006
74/01/31	16 00		0.040	1.000K	9.700	1.600	2.500	0.015	0.015
74/02/28	16 30		1.680	1.000K	0.050K	1.700	2.100	0.005	0.005
74/03/31	16 30		1.720	1.000K	0.250K	0.955	1.450	0.005	0.005
74/04/30	16 30		1.440	1.000K		0.580	0.810	0.005	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

14

STORET RETRIEVAL DATE 76/03/30

1827YA AS1827YA P000200
40 30 20.0 085 39 25.0 4
DEERWOOD COURT MHP
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
DEER CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/29	17 00		3.400	5.950	0.140	4.100	5.100		0.009
73/08/01	14 00		0.150	18.000	5.900	3.000	4.940		
73/09/01	11 30			8.100	0.160	3.200	4.000	0.008	
73/10/02	16 00		0.019	29.000	13.700	1.990	6.050	0.008	
73/11/05	17 20		0.210	23.000	13.000	1.680	2.400		
73/12/06	16 30		0.190	20.000	8.800	1.900	2.400		
74/01/07	16 35		0.120	15.000	5.040	2.800	3.000		
74/02/02	18 00		0.280	14.000	3.800	2.000	5.700		
74/03/05	18 30		0.520	22.500	7.400	4.500	6.000		
74/04/01	11 00		6.800	1.000K	0.050K	2.500	2.800		
74/05/03	17 30		0.320	6.500	0.079	4.200	5.200		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827XA TF1827XA P003000
40 27 30.0 085 29 25.0 4
UPLAND
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
LAKE BRANCH
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/11	12 30		2.100	29.000	8.200	3.800	5.400	0.300	0.415
73/07/11	12 15		1.150	22.000	6.400	5.000	6.100	0.250	0.380
73/08/15	08 45		2.100	8.200	0.110	0.730	2.400	0.886	0.280
73/09/10	10 30		0.320	29.000	12.200	4.060	5.050	0.380	0.350
73/10/10	09 15		0.360	20.000	9.500	3.300	4.950	0.408	0.432
73/11/13	08 15		0.200	26.000	12.600	4.200	5.300	0.355	0.360
73/12/12	12 15		0.540	27.000	11.200	4.000	5.600	0.387	0.426
74/01/11	13 30		1.200	17.000	6.600	3.300	4.300	0.340	0.309
74/02/11	12 45		0.560	26.000	8.100	3.000	5.100	0.314	0.334
74/03/12	13 00		0.400	17.000			5.000	0.484	0.591
74/04/11	14 45		1.440	1.000K	0.130	1.450	1.700	0.462	0.624
74/05/10	14 15		0.520	17.000	4.500	2.900	4.150	0.572	0.414
74/06/10	12 50		3.800	1.000K	0.910	2.600	3.600	0.369	0.316

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827WB AS1827WB P003474
40 25 42.0 085 39 00.0 4
FAIRMONT
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
BACK CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/11	08 00		0.850	8.050	0.037	0.760	0.910	0.544	0.521
73/08/11	08 15		0.080	33.600	7.100	2.520	14.500	0.213	0.308
73/09/11	08 00		0.010K	30.000	11.300	8.360	11.500	0.400	0.373
73/10/11	08 30		0.020	25.000	18.000	3.100	4.200	0.400	0.400
73/11/12	08 30		0.190	30.000	16.800	2.200	6.600	0.350	0.440
73/12/11	09 30		0.740	12.500	2.500	2.100	2.500	0.550	0.500
74/01/11	09 00		0.880	9.300	1.900	1.040	1.200	0.300	0.300
74/02/14	08 00		6.000	1.300	0.051	0.810	1.050	0.450	0.401
74/03/11	20 30		6.600	1.000K	0.050K	0.050K	1.200	0.450	0.400
74/04/11	08 30		7.920	1.000K	0.063	1.450	1.500	0.325	0.430
74/07/11	09 00		0.040	17.000	0.200	3.300	3.900	0.375	0.400
74/08/12	08 30		4.500	25.000	10.500	0.975	1.550	0.250	0.350
74/09/11	21 30		0.400	22.000	10.000	1.400	1.650	0.350	0.350
74/10/14	09 00		5.940	19.500	13.000	4.500	5.000	0.150	0.300

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827WA TF1827WA P002500*
40 28 20.0 085 38 00.0 4
JONESBORO
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
BACK CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/09/24	12 00		3.200	10.500	1.050	0.084	0.915	0.200	0.280
73/10/18	11 00		0.480	17.000	2.500	0.189	0.930	0.100	0.323
73/11/27	12 00		1.470	10.000	0.035	0.222	0.690	0.350	0.322
73/12/26	13 00		1.380	4.700	0.130	0.310	0.490	0.600	0.240
74/01/21	10 00		3.840	7.400	0.076	0.069	0.500	1.100	0.380
74/03/19	11 00		0.640	12.000	0.870	0.620	1.900	0.200	0.360
74/04/22	11 00		1.920	9.800	0.780	0.150	0.870	0.200	0.466

STORET RETRIEVAL DATE 76/03/30

1827AC TF1827AC P002000
40 20 45.0 085 21 52.0 4
EATON
18 DELAWARE CO HWY
T/MISSISSINEWA RESERVOIR 051792
MISSISSINEWA RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/06	15 00		3.700	3.000	0.270	0.880	1.500	0.675	0.739
73/07/06	15 00		4.100	10.500	0.190	3.200	4.600	0.317	0.378
73/08/06	15 00		2.900	15.400	3.080	3.300	4.300	0.707	0.718
73/10/05	16 00		0.940	17.200	4.100	3.200	3.600	1.020	0.783
73/12/06	15 00		2.200	13.000	1.200	1.890	2.600	0.800	0.710
74/01/04	15 00		2.640	10.000	0.130	1.320	1.650	0.650	0.650
74/02/06	09 00		1.920	8.600	0.310	1.440	2.100	0.650	0.620
74/03/06	09 00		3.200	4.300	0.050K	0.800	1.050	0.650	0.560
74/04/05	08 30		2.640	1.400	0.050K	0.570	0.760	0.490	0.530
74/05/06	08 30		3.300	12.000	0.032	2.000	3.100	0.425	0.390
74/06/06	08 00		3.400	7.300	0.100	1.600	2.600	0.425	0.400
74/08/06	08 30		1.480	26.000	4.900	2.400	4.900	0.220	0.200
74/09/09			5.800	14.500	0.275	3.350	4.600	0.160	0.178

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827AB TF1827AB P005742
40 28 35.0 085 37 25.0 4
GAS CITY
18 GRANT CO HWY MAP
T/MISSISSINEWA RESERVOIR 051791
MISSISSINEWA RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/07	14 00		1.160	14.000	1.100	1.900	2.600	0.793	0.390
73/07/09	15 30		1.700	22.000	9.100	4.480	5.400	0.336	0.546
73/09/07	10 00		4.580	9.800	0.100	3.760	9.800	0.344	0.348
73/10/08	11 00		1.470	15.500	5.600	3.500	5.700	0.243	0.297
73/11/06	11 00		3.600	15.000	3.200	4.300	5.200	0.194	0.231
73/12/07	09 30		7.800	9.700	0.042	3.300	4.000	0.253	0.310
74/01/02	13 00		2.900	13.000	1.680	2.640	3.300	0.363	0.338
74/02/05	11 00		0.400	14.000	4.000	2.700	3.600	0.300	0.512
74/03/05	13 00		2.520	6.300	0.050K	0.850	1.150	0.911	0.366
74/04/03	13 00		3.200	10.000	0.090	0.890	2.000	0.680	0.436
74/05/02	11 00		1.600	13.000	0.550	3.000	3.800	0.250	0.399

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1827AA AS1827AA P040843*
40 34 45.0 085 39 30.0 4
MARION
18 7.5 MARION
T/MISSISSINEWA RESERVOIR 051791
MISSISSINEWA RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/12	00	00							
CP(T)-			1.890	8.600	0.100	0.840	0.930	14.000	9.700
73/06/12	02	00							
73/07/05	08	00							
CP(T)-			2.700	6.180	0.099	0.580	2.600	9.540	11.500
73/07/06	06	00							
73/08/06	10	00							
CP(T)-			1.500	5.050	0.080	0.920	1.200	10.600	8.500
73/08/07	10	00							
73/09/06	08	00							
CP(T)-			4.100	5.000	0.085	0.750	0.870	9.800	11.700
73/09/07	06	00							
73/10/09	12	00							
CP(T)-			0.180	10.250	10.200	1.700	1.775	6.270	8.840
73/10/09	22	00							
73/12/06	08	00							
CP(T)-			0.990	6.850	0.018	0.290	0.490	12.400	9.430
73/12/06	20	00							
64/01/08	24	00							
CP(T)-			1.240	5.100	0.170	1.000	1.500	10.100	10.100
74/01/08	22	00							
74/03/12	24	00							
CP(T)-			0.080	1.000K	0.050K	0.050K	0.750	10.900	9.720
74/03/13	22	00							
74/04/02	24	00							
CP(T)-			2.760	3.800	0.050K	0.190	0.315	11.600	12.000
74/04/13	22	00							
74/06/05	00	00							
CP(T)-			0.240	8.200	0.390	0.510	0.890	12.600	11.700
74/06/05	24	00							

K VALUE KNOWN TO BE
LESS THAN INDICATED